

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is used only with an arc tube, without preparing metal halide lamp equipment, especially an outer tube, and relates to metal halide lamp equipment equipped with the blower style used as the comparatively small light source for images etc.

[0002]

[Description of the Prior Art] The short arc metal halide lamp used only with an arc tube, without preparing an outer tube conventionally is used by the descriptions, like the goodness and luminous efficiency of the color rendering properties are large as the light source of a liquid crystal projector the visual equipment using optical system, for example, an overhead projector, and overhead type or liquid crystal projection TV, a projector, etc., and is spreading according to them.

[0003] Thus, as the small metal halide lamp for images used only with an arc tube, without preparing an outer tube is made into mass lamp power to the volume of luminescence and becomes the almost same value as the metal halide lamp which prepared the outer tube about the enclosure additive vapor pressure within luminescence using a rare earth metal halogenide, he is trying to acquire a good color property.

[0004]

[Problem(s) to be Solved by the Invention] However, since the lamp power per volume of luminescence is large, the enclosed rare earth metal halogenide reacts with the quartz material which constitutes the arc tube container, and a devitrification phenomenon occurs at an early stage in the elevated-temperature section. When the arc tube was arranged horizontally and the light was switched on, and the devitrification in this part became remarkable and irradiated a screen as the light source for images since the upper part of an arc tube turned into the maximum elevated-temperature section, the color on a screen also changed and there was a problem that degradation of an illuminance was remarkable.

[0005] In order to cancel this fault, the blower style for cooling the up front face of an arc tube conventionally is prepared, a devitrification rate is controlled, and what reduced decline in an illuminance maintenance factor is proposed.

[0006] However, although the devitrification phenomenon of an arc tube will be suppressed and decline in an illuminance maintenance factor will also be controlled if a blower style is prepared in this way and it is made to perform air blasting cooling on the front face of up of an arc tube, air blasting by this blower style lowers the temperature of not only the maximum elevated-temperature section but the coldest part, or forms the coldest part in other parts. Therefore, vapor pressure fell and there was a trouble that a color property will get worse from the time of burning.

[0007] This invention aims at offering the long lasting metal halide lamp equipment which controlled the devitrification rate, without having been made in order to cancel the above-mentioned trouble in metal halide lamp equipment equipped with the conventional blower style, and degrading a color property.

[0008]

[Means for Solving the Problem and its Function] In order to solve the above-mentioned trouble, in the metal halide lamp equipment arranges horizontally the arc tube which does not prepare the outer tube which enclosed the halogenide which contains a rare earth metal at least, and it was made turn on, this invention arranges the blast nozzle for cooling for ventilating on the up front face of an arc tube on the seal section of said arc tube, and gives the incubation film to the up front face of the luminescence tube-seal section by the side of arrangement of this blast nozzle.

[0009] Thus, it sets to the constituted metal halide lamp equipment. Since the seal section is kept warm by the incubation film prepared in the front face even if a part of air blasting from a nozzle hits the seal section in case air blasting is performed from a blast nozzle, It can control a devitrification rate that the coldest part is formed in a seal section base, or the coldest part of the luminescence jurisdiction section is cooled, without being prevented, therefore degrading a color property.

[0010]

[Example] Next, an example is explained. Drawing 1 is the perspective view fracturing and showing a part of one example of the metal halide lamp equipment concerning this invention. In drawing, 1 is the arc tube equipped with the main electrodes 2 and 2 supported by the ends seal section made from a quartz, and the content volume has enclosed the argon and mercury as about 1mg and start-up gas for that to which $\phi 11\text{mm}$ and the maximum bore are set as $\phi 8.8\text{mm}$, the arc length is set as 5.0mm, and about 0.4 cc and the maximum outer diameter set an iodation

dysprosium, iodation neodymium, and a cesium iodide to 4:2:3 by the weight ratio. And the incubation [an echo-cum-] film 3 of a white oxide is applied to one seal section so that the main electrode 2 prepared in a it side may be surrounded. Moreover, the mouthpiece 4 which formed the blast nozzle 5 in one flank in one is attached in the seal section which counters so that it may turn to an arc tube up front face by the blast nozzle 5 and air blasting may be performed. Moreover, the fine particles which consist of mixture (mixing ratio 1:1) of for example, an alumina silica were applied to about 0.2mm in thickness, and heat insulating material 6 is formed in the up front face of the seal section facing the arrangement side of a blast nozzle 5. And to the arc tube 1 constituted in this way, by pasting up the mouthpiece 4 using a ceramic, as the arc tube 1 was surrounded, the lead wire 8 for electric power supplies was connected to the end of installation and a mouthpiece 4 for the parabolic reflector 7 with the cold mirror of infrared transparency, and the nozzle duct 9 which consists of silicone rubber for supplying cooling air to the base of a blast nozzle 5 is connected.

[0011] Thus, the constituted metal halide lamp equipment arranges 150 W lamp power horizontally as rating with square wave electronic ballast, and is turned on. Cooling air 1l./m is supplied from the nozzle duct 9 connected to the blast nozzle 5, and it is ventilated towards the arc tube upper part from a blast nozzle 5. Thereby, arc tube up temperature 925 ** at the time of no ventilating is lowered to 880 **. On the other hand, 820 ** at the time of no ventilating hardly changes to 818 **, and lower temperature is almost changeless at extent to which a color property also changes x at the time of calm, and y chromaticity coordinate (0.290 0.330) to (0.288 and 0.327). Therefore, the devitrification rate of the arc tube upper part can be controlled, without changing a color property.

[0012] In order to contrast with the example of above-mentioned this invention, what does not form heat insulating material in the seal section is used. When air blasting is similarly performed from a nozzle and change of a color property is measured, x and y chromaticity coordinate change to (0.265 and 0.305) remarkably by ventilating. Moreover, Ra Changing to 70 from 88 was confirmed and it was checked that the operation effectiveness of heat insulating material prepared in the up front face of the seal section by this invention is remarkable.

[0013] In addition, the same effectiveness was acquired even if formed using the slurry which the heat insulating material formed in the up front face of the seal section used not only the thing of the above-mentioned example but silica wool, and a zirconium dioxide as the principal member, and used colloidal silica etc. as the binder.

[0014]

[Effect of the Invention] Maintaining a color property, since heat insulating material was formed in the up front face of the seal section by the side of a nozzle configuration according to this invention as explained based on the example above, a devitrification rate can be controlled and the metal halide lamp equipment equipped with the blower style which raised the screen illuminance maintenance factor can be obtained.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] It is arranged in the front face of a reflecting mirror, the light is switched on, and this invention relates to the metal halide lamp with a reflecting mirror used as the object for images, or an object for general lighting.

[0002]

[Description of the Prior Art] Conventionally, the small metal halide lamp constituted combining the arc tube and the reflecting mirror is used by the descriptions, like the goodness and luminous efficiency of the color rendering properties are large as the light source of an overhead projector, a projection TV, a projector, etc., etc., and is spreading. In order to obtain that the metal halide lamp used as the light source of such equipment does not have aging in the property of a lamp, and high brightness, it is required that condensing effectiveness should be high.

[0003]

[Problem(s) to be Solved by the Invention] However, conventionally, a metal halide lamp has change of lamp voltage, the fall of a color temperature, and the fall of an illuminance as aging, and the present condition is that it cannot be satisfied as the light source for images.

[0004] Aging of a metal halide lamp was the cause of the melanism of the tube wall by scattering of an electrode started in early stages, and the devitrification of quartz glass and the glass tube by the reaction of enclosure metal halide from which the last stage is started that two kinds were big. early melanism -- a phenomenon causes change of the color temperature by change of the temperature which influences a lifting and determining vapor pressure further greatly in change of lamp voltage, and change of the temperature which influences determining vapor pressure greatly. It is for the vapor pressure of the metal halide of the saturation state enclosed within luminescence to rise by the rise of the temperature which influences determining vapor pressure greatly.

[0005] Moreover, the quartz itself generates the devitrification phenomenon of the quartz glass which is the arc tube of the last stage by the rise of condensed mercury temperature by the reaction with the evaporation and metal halide which the reattachment is carried out or is the enclosure matter. As a result, the permeability of light falls and the fall of the own illuminance of a lamp is caused. Furthermore, at the time of luminescence, ***** of the metal halide in a saturation state became a shadow, and has lowered the outgoing radiation effectiveness of light.

[0006] This invention does not have aging of lamp voltage and a color temperature, and it aims at gathering condensing effectiveness more. Therefore, it aims at controlling aging of temperature which influences determining vapor pressure greatly.

[0007]

[Means for Solving the Problem] This invention is equipped with the own local cooling means of an arc tube in order to solve this technical problem. Therefore, luminescence property control of a lamp and aging are decreased by realizing the part which influences determining vapor pressure within luminescence compulsorily greatly, and controlling the vapor pressure property of the metal halide within luminescence.

[0008]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained using a drawing.

[0009] (Gestalt 1 of operation) Drawing 1 shows the metal halide lamp with a reflecting mirror possessing the local hypothermia means in the gestalt of operation of the 1st of this invention. In drawing 1, in 1, a metal halide lamp, the ventilation equipment with which in a reflecting mirror and 3 the incubation film and 5 built in the nozzle as a local hypothermia means, and, as for 6, external lead wire and 4 built [2] in the blower fan and the fan drive circuit, and 7 show the lamp voltage monitor section and an operation signal circuit, and 8 shows a lamp drive circuit.

[0010] Actuation of the metal halide lamp constituted as mentioned above is described. Drawing 2 cools the lamp luminescence tube bottom section, and shows the configuration in the case of acting as the monitor of the temperature and the electrical property at the time of a cooling part. Nine in drawing is the diameter of 10mm, a globular shape, and a metal halide lamp using the arc tube of inter-electrode distance known, and, for the ventilation equipment with which, as for 10, the diffuser of a nozzle built in the blast nozzle with a diameter of 1mm, and 11 built in the blower fan and the fan drive circuit, and 12, as for a lamp drive circuit and 14, a fan rotation controller and 13 are [an amplitude-measurement device and 15] radiation thermometers. The cooling area of 5mm and a lamp of the distance of ventilation opening of the lamp tube bottom section to a blast nozzle is 2 1.5mm. In addition, the lamp is driven so that it may become power regularity.

[0011] Drawing 3 is the relation of the electric field of a lamp and arc tube bottom point section temperature which were acquired as mentioned above. The electric field E of a lamp are $E=V/a/d$. Here, V/a is lamp voltage and d is inter-

electrode distance. Since the inter-electrode distance d was an existing value, electric field E were calculated with the monitor value of lamp voltage V_{la} .

[0012] In drawing 3, a was calm, gradually, strengthened cooling extent and performed it. Although the temperature of a tube bottom section cooling part falls as cooling extent is strengthened, the electric field of a lamp hardly change. This is the field of b . Furthermore, if cooling extent is strengthened, the temperature of a tube bottom cooling part will be followed and electric field will also come to change. This is the field of c . Generally, since the electrical potential difference of a lamp is set up with vapor pressure, in the field of c , it is checked that the cooling part is the part which influences determining vapor pressure greatly. That is, although the part which influences greatly determining vapor pressure in b field from a exists in locations other than the tube bottom section, if the temperature of a cooling part is lowered to c field, it will be thought that the part which influences greatly determining vapor pressure as the tube bottom section shifted.

[0013] By making the part which influences greatly determining vapor pressure by cooling the part of the arbitration of a lamp on a part shift to the part of arbitration, and controlling the temperature of the part from the above thing, shows that it is possible to control the electric field of a lamp.

[0014] In the metal halide lamp constituted like drawing 1, according to change of electric field E , rotation of a cooling fan 6 was changed and aging of lamp voltage was lost by keeping constant the temperature which influences determining vapor pressure greatly. Moreover, change of a color temperature was also lost by making regularity temperature which influences determining vapor pressure greatly.

[0015] Drawing 4 shows the metal halide lamp at the time of lamp lighting when not carrying out local hypothermia, and 16 is the bank of the metal halide liquid phase section. When not carrying out local hypothermia, the bank 16 of the metal halide liquid phase section became a shadow, and has lowered the outgoing radiation effectiveness of light.

[0016] The part which influences greatly determining the vapor pressure realized compulsorily is fundamentally possible in every part of a lamp arc tube. However, in order for metal halide to collect at the time of early lighting and to control a part, it is desirable to carry out local hypothermia before lighting. If the light is switched on in the state of local hypothermia, metal halide can be moved to the local hypothermia section.

[0017] Furthermore, what is necessary is to carry out the temperature up of the lamp at a burner, a furnace, etc. before lamp lighting, and just to give local hypothermia at a position at the time of cooling. Although especially a metal halide lamp creates the incubation film 4 in the lamp exterior in order to improve a vapor pressure property, it can make ***** of metal halide by giving the above-mentioned local hypothermia process to the inside to which the incubation film 4 was applied. If lamp lighting is carried out in this condition, since the shadow which is the saturation part of metal halide and which is depended for collecting will not occur in a part for a light-emitting part, it is possible to gather the outgoing radiation effectiveness of light.

[0018] Moreover, the metal halide liquid phase section is fixed to incubation ***** 4 by carrying out local hypothermia of incubation ***** 4 by the side of reflecting mirror opening also at the time of lighting. Since incubation ***** 4 by the side of reflecting mirror opening is a part which does not contribute to condensing, the shadow of the metal halide liquid phase section of it is lost, and it can improve the outgoing radiation effectiveness of light.

[0019] (Gestalt 2 of operation) In the actual metal halide lamp, with lighting time amount, the temperature which influences determining vapor pressure greatly rises, and lamp voltage rises. Therefore, it is desirable to change refrigeration capacity to the rise of lamp voltage. Drawing 5 shows the metal halide lamp possessing the local hypothermia means in the gestalt of operation of the 2nd of this invention with a reflecting mirror.

[0020] drawing 5 -- setting -- 17 -- a metal halide lamp and 18 -- a reflecting mirror and 19 -- for the pipe as a cooling means, and 22, as for a circulating pump and 24, a condensator and 23 are [external lead wire and 20 / the incubation film and 21 / the lamp voltage monitor section, an operation signal circuit, and 25] lamp drive circuits.

[0021] Actuation of the metal halide lamp constituted as mentioned above is described. First, since a lamp becomes an elevated temperature very much, as the cooling section, the electrode closure section is good. A closure part is made to cool with a refrigerant and it controls by the condensator 22 to predetermined temperature. Moreover, since lamp electric field change, it enables it to control cooling temperature freely with lighting time amount according to the change. At this time, lamp voltage controls cooling temperature by the condensator 22 by detecting and calculating in the lamp voltage monitor section 24.

[0022] (Gestalt 3 of operation) Although fixed [of the life of a metal halide lamp] is carried out by flux of light attenuation, it is the big factor which is especially depended on the reaction of metal halide and quartz glass. This reaction is early produced, so that the temperature of a quartz tube bulb is high. It turned out that the part which influences determining vapor pressure greatly exists in somewhere else with the property shown by drawing 3 rather than that is in a tube wall pars basilaris ossis occipitalis. Therefore, even if it cools tube wall ambient temperature as

much as possible, it turns out that the spectral characteristic does not change. In fact, it checked that the spectral characteristic did not change even if it cools a tube wall pars basilaris ossis occipitalis in the field of b by drawing 3 .

[0023] Local hypothermia of the tube wall upper part, a center section, and the pars basilaris ossis occipitalis was carried out so that the maximum cold spot temperature might not be changed. It actually became possible at this time to make the light change and switch on also of the spectral characteristic. It is thought that the part which influences determining vapor pressure probably greatly is near the electrode closure section. In the usual lighting of the metal halide attached for the reflecting mirror, it is thought that the electrode closure part near the reflecting mirror is the part which influences determining vapor pressure greatly.

[0024]

[Effect of the Invention] As mentioned above, according to this invention, temperature which influences determining the vapor pressure inside a lamp greatly is compulsorily realized locally from the outside, the vapor pressure of metal halide is controlled, and the remarkable effectiveness that aging of lamp voltage and a color temperature can be made small as a result is acquired.

[0025] Moreover, the effectiveness of having controlled ***** of metal halide and raising the outgoing radiation effectiveness of light was also acquired by establishing the part which influences determining vapor pressure greatly in the part which does not have effect in the outgoing radiation part of light as much as possible.

[Translation done.]